PARENT/STUDENT AGREEMENT FORM
STUDENT NAME (PRINT):

_____

To: Future Bobcat Geometry or Algebra 2 Parents, Guardians and Students

Algebra 2 and College Readiness

PURPOSE AND EXPLANATION OF PACKET:

Hello!

As future Geometry or Algebra 2 students, you will be held responsible and accountable to complete this packet.

The following pages are filled with basic prerequisite skills needed to prepare you for this rigorous course. Each page has specific set of problems for you to complete.

This packet will be COLLECTED THE VERY FIRST WEEK of school. It will also be counted as your very first homework or classwork grade. YOU MUST SHOW ALL WORK TO RECEIVE FULL CREDIT FOR THIS PACKET. A PACKET WITH NO WORK WILL BE GIVEN A GRADE OF ZERO. An assessment testing your knowledge on these skills will also be given during the very first school week.

Take this time to prepare yourself to be successful for this rigorous and demanding course.

DIRECTIONS ON COMPLETING THE PACKET:

This packet must be done on a SEPARATE SHEET OF NOTEBOOK PAPER!

1) EACH SET OF PROBLEMS MUST BE LABELED PROPERLY WITH THE CORRESPONDING TITLE (found at the top of each page).
2) EACH PROBLEM MUST BE NUMBERED PROPERLY.
3) ALL WORK MUST BE SHOWN WITH FINAL ANSWERS CIRCLED/BOXED/HIGHLIGHTED. DO NOT USE A CALCULATOR!

Have this ready to turn in on the first day of school. It must be STAPLED in the following order.

1) Parent/student agreement form
2) The enrichment problems (pages following this packet)
3) Your notebook paper with your work

Best Regards,
Your Future Bobcat Geometry or Algebra 2 Teacher

By signing below, you are acknowledging that you understand and agree with the purpose and worth of this packet.

_____ _____
PARENT/ GUARDIAN SIGNATURE DATE

_____ _____
STUDENT SIGNATURE DATE

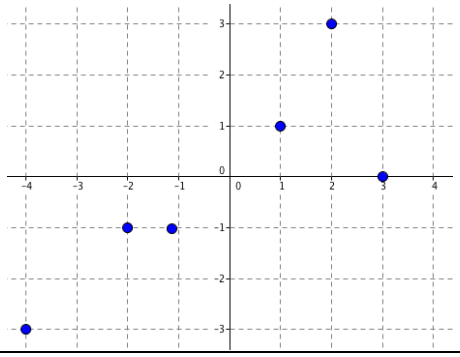
Algebra 2 (Regular and Honors) and College Readiness
Summer 2015 Assignment

Directions: Complete the exercises below WITHOUT the use of a calculator. Make sure to show all of work, neatly!

I. State the domain and range of each relation. Then determine whether each relation is a function; *explain* your reasoning.

a) $\{(4,5),\ (5,-1),\ (0,12),\ (0,-2),\ (7,9)\}$

b)



II. Name the quadrant in which each point is located.

a) (-3, 7)	b) (10, -11)	c) (0, 5)	d) $\left(\frac{42}{5}, 6\right)$

EXAMPLE 1 **Use the FOIL Method**

Find each product.

a. $(x+3)(x-5)$

F L First Outer Inner Last

$(x+3)(x-5) = x \cdot x + x \cdot (-5) + 3 \cdot x + 3 \cdot (-5)$

I

O

$= x^2 - 5x + 3x - 15$

$= x^2 - 2x - 15$

III. Find the product.

a) $(2x+9)(x+1)$	b) $(5x-1)(6x-10)$	c) $(3x^2-4)(3x^2+4)$

IV. The height of a rectangle is 3 units less than twice the width.

a) If the width of the rectangle is represented by the variable *w*, write an expression for the height in terms of *w*.	b) Write an expression for the area of the rectangle in terms of *w*.

Factoring Polynomials

Some polynomials can be factored using the Distributive Property.

EXAMPLE 1 Use the Distributive Property

Factor $4a^2 + 8a$.

Find the GCF of $4a^2$ and $8a$.

$4a^2 = 2 \cdot 2 \cdot a \cdot a$ $\quad 8a = 2 \cdot 2 \cdot 2 \cdot a \quad \rightarrow \quad$ GCF: $2 \cdot 2 \cdot a$ or $4a$

$4a^2 + 8a = 4a(a) + 4a(2)$ **Rewrite each term using the GCF.**

$= 4a(a + 2)$ **Distributive Property**

Thus, the completely factored form of $4a^2 + 8a$ is $4a(a + 2)$.

To factor quadratic trinomials of the form $x^2 + bx + c$, find two integers m and p with a product equal to c and a sum equal to b. Then write $x^2 + bx + c$ using the pattern $(x + m)(x + p)$.

EXAMPLE 2 Use Factors and Sums

Factor each polynomial.

a. $x^2 + 5x + 6$ ← Both b and c are positive.

In this trinomial, b is 5 and c is 6. Find two numbers with a product of 6 and a sum of 5.

Factors of 6	Sum of factors
1, 6	7
2, 3	5

The correct factors are 2 and 3.

$x^2 + 5x + 6 = (x + m)(x + p)$ **Write the pattern.**

$= (x + 2)(x + 3)$ **$m = 2$ and $p = 3$**

b. $x^2 - 8x + 12$ ← b is negative, and c is positive.

In this trinomial, $b = -8$ and $c = 12$. This means that $m + p$ is negative and mp is positive. So m and p must both be negative.

Factors of 12	Sum of factors
−1, −12	−13
−2, −6	−8

The correct factors are −2 and −6.

$x^2 - 8x + 12 = (x + m)(x + p)$ **Write the pattern.**

$= [x + (-2)][x + (-6)]$ **$m = -2$ and $p = -6$**

$= (x - 2)(x - 6)$ **Simplify.**

c. $x^2 + 14x - 15$ ← b is positive, and c is negative.

In this trinomial, $b = 14$ and $c = -15$. This means that $m + p$ is positive and mp is negative. So either m or p must be negative, but not both.

Factors of −15	Sum of factors
1, −15	−15
−1, 15	14

The correct factors are −1 and 15.

$x^2 + 14x - 15 = (x + m)(x + p)$ **Write the pattern.**

$= [x + (-1)](x + 15)$ **$m = -1$ and $p = 15$**

$= (x - 1)(x + 15)$ **Simplify.**

Here are some special products.

Perfect Square Trinomials

$(a+b)^2 = (a+b)(a+b) = a^2 + 2ab + b^2$

$(a-b)^2 = (a-b)(a-b) = a^2 - 2ab + b^2$

Difference of Squares

$a^2 - b^2 = (a+b)(a-b)$

EXAMPLE 4 **Use Special Products**

Factor each polynomial.

a. $4x^2 + 20x + 25$ ← The first and last terms are perfect squares. The middle term is equal to $2(2x)(5)$. This is a perfect square trinomial of the form $(a+b)^2$.

$4x^2 + 20x + 25 = (2x)^2 + 2(2x)(5) + 5^2$ — Write as $a^2 + 2ab + b^2$.

$= (2x+5)^2$ — Factor using the pattern.

b. $x^2 - 4$ ← This is a difference of squares.

$x^2 - 4 = x^2 - (2)^2$ — Write in the form $a^2 - b^2$.

$= (x+2)(x-2)$ — Factor the difference of squares.

To factor quadratic trinomials of the form $ax^2 + bx + c$, find two integers m and p with a product equal to ac and a sum equal to b. Write $ax^2 + bx + c$ using the pattern $ax^2 + mx + px + c$. Then factor by grouping.

EXAMPLE 3 **Use Factors and Sums**

Factor $6x^2 + 7x - 3$.

In this trinomial, $a = 6$, $b = 7$, and $c = -3$. This means that $m + p$ is positive and mp is negative. So either m or p must be negative, but not both.

Factors of -18	Sum of factors
$1, -18$	-17
$-1, 18$	17
$2, -9$	-7
$-2, 9$	7

The correct factors are -2 and 9.

$6x^2 + 7x - 3 = 6x^2 + mx + px - 3$ — Write the pattern.

$= 6x^2 + (-2)x + 9x - 3$ — $m = -2$ and $p = 9$

$= (6x^2 - 2x) + (9x - 3)$ — Group terms with common factors.

$= 2x(3x-1) + 3(3x-1)$ — Factor the GCF from each group.

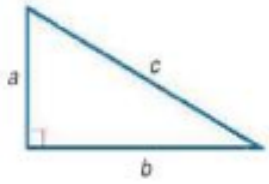
$= (2x+3)(3x-1)$ — Distributive Property

V. Factor each polynomial completely.

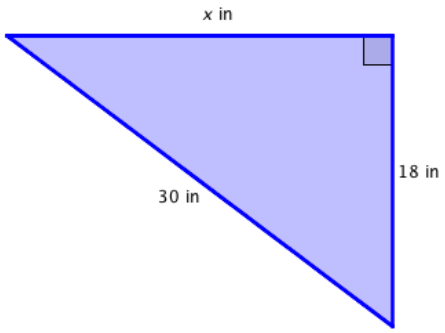
a) $4x^2 + 12x^7$	b) $81x^2 - 36$	c) $x^2 - 16x + 63$
d) $x^2 - 7x - 18$	e) $25x^2 - 20x + 4$	f) $2p^3 + 5p^2 + 6p + 15$
g) $12x^8y^{12} - 75x^6y^{16}$	h) $4x^2 - 7x - 15$	i) $x^2 + 40x + 400$
j) $3n^3 - 4n^2 + 9n - 12$	k) $12a^4b - 18a^3b^2 + 24ab^5$	l) $x^2 + x + 0.25$
m) $4x^3 + 43x^2 + 30x$	n) $4x^2 - x - 5$	o) $4x^2 + 4xy + y^2$
p) $x^4 - 1$	q) $5(x-3)^3 + 2(x-3)^2$	r) $25 - x^2$
s) $81a^2 + 198ab + 121b^2$	t) $7x^2 - 32x - 60$	u) $12xy - 28x - 15y + 35$

The **Pythagorean Theorem** states that in a right triangle, the square of the length of the hypotenuse c is equal to the sum of the squares of the lengths of the legs a and b.

That is, in any right triangle, $c^2 = a^2 + b^2$.



VI. Find the measure of *x*.



VII. The lengths of three sides of a triangle are given. Determine whether each triangle is a right triangle. Show the work that leads to your conclusion.

a) 6, 8, 12	b) 9, 12, 15

VIII. Complete each statement for the given property.

a) Commutative Property of Addition: a + b = _____
b) Commutative Property of Multiplication: a · b = _____
c) Associative Property of Addition: (a + b) + c = _____
d) Associative Property of Multiplication: (a · b) · c = _____
e) Additive Inverse of Addition: a _____ = _____
f) Multiplicative Inverse: a _____ = _____

An absolute value inequality can be solved by rewriting it as a compound inequality.

Key Concept **Absolute Value Inequalities**

For all real numbers a, b, c, and x, $c > 0$, the following statements are true.

Absolute Value Inequality	Compound Inequality	Example
$\|ax + b\| > c$	$ax + b > c$ or $ax + b < -c$	If $\|4x + 5\| > 7$, then $4x + 5 > 7$ or $4x + 5 < -7$.
$\|ax + b\| < c$	$-c < ax + b < c$	If $\|4x + 5\| < 7$, then $-7 < 4x + 5 < 7$.

These statements are also true for $\leq$ and $\geq$, respectively.

IX. Solve.

a) $\|9x + 4\| - 11 = -4$	b) $\|7x + 2\| - 8 = -15$	c) $-\|3x + 4\| = 5x + 4$
d) $\frac{3x+14}{5} > 8 - 2x$	e) $-8 < \frac{1}{2}(6x - 10) \leq 13$	
f) $\|-4x - 3\| \geq 11$	g) $6 > \|7x - 5\|$	

X. Evaluate each expression if $a = \frac{3}{4}$, $b = -8$, $c = -\frac{1}{2}$, $d = 3$, $f = -\frac{1}{3}$

a) $ab^2 - d$	b) $\frac{ab}{c} + d^2$

XI. Solve.

a) $-2\left(\frac{1}{4}x - \frac{2}{3}\right) + \left(\frac{1}{2}x + \frac{3}{4}\right) = 5(3x - 6)$	b) $\frac{2}{3}(4x - 5) = \frac{1}{4}(7 - 3x)$	c) $3 - \frac{1}{5}(x - 8) = 3x - \left(\frac{x}{4} + 6\right)$

XII. Fill in the blanks.

a) Two lines are parallel if:_____.
b) Two lines are perpendicular if: _____.
c) To find an x-intercept: _____.
d) To find an y-intercept: _____.

Link to how to graph a linear function: https://weteachscience.org/mentoring/resources/lesson-plans/algebra-1-%E2%80%93-how-to-graph-a-linear-equation-using-slope-and-y

Link to how to graph a linear equation:
http://www.regentsprep.org/regents/math/algebra/AC1/EqLines2.htm

Link to how to graph an absolute value function:
http://www.algebra.com/algebra/homework/absolute-value/absolute-value.faq.question.363181.html

Link to how to graph linear inequalities:
http://www.mathwarehouse.com/algebra/linear_equation/linear-inequality.php

XIII. Sketch the graph.

a) $y = 3x + 5$	b) $y = \frac{x}{2} - 3$
c) $4x - 3y = 12$	d) $y - 1 = -4(x + 5)$
e) $y = 7$	f) $x = 7$
g) $y = \lvert x + 2 \rvert - 3$	h) $y = \lvert x - 4 \rvert + 1$
i) $3x + 7y < -21$	j) $y \geq \lvert x + 1 \rvert + 6$

Link to how to write an equation in standard form:
http://www.algebralab.org/studyaids/studyaid.aspx?file=algebra1_5-5.xml

XIV. Write the equation of a line in *standard form* with the given characteristics.

a) Passes through (6, 1) and is perpendicular to the line $3x - 4y = 2$.
b) Has an x-intercept of (9, 0) and a y-intercept of (0, -3).
c) Passes through the point (4, 7) and is parallel to the line that passes through the points (-1, 8) and (5, -6).

Link to solving systems of equations:
http://www.mathwarehouse.com/algebra/linear_equation/systems-of-equation/index.php

XV. Solve each system.

a) $3x-6y=2$ $5x+4y=1$	b) $2x+y=1$ $4x+2y=3$
c) $x+2y=4$ $2x+4y=8$	d) $\frac{x}{3}-\frac{y}{4}=1$ $\frac{x}{2}-\frac{y}{3}=-2$

Link to solving systems of inequalities by graphing:
http://www.mathwarehouse.com/algebra/linear_equation/systems-of-equation/system-linear-inequality.php

XVI. Solve the system of inequalities by graphing.

a) $y<2x-3$ $y\geq 4$	b) $y>2$ $y\leq -2$ $x>3$	c) $y\leq -\lvert x+1\rvert+4$ $y>2$

Link to simplifying expressions with exponents:
http://www.purplemath.com/modules/simpexpo.htm

XVII. Simplify. Your answer should contain only positive exponents.

a) $\left(2x^4\right)^{-3}\cdot 2x^4$	b) $\frac{2x^2y^4\cdot 4x^2y^4\cdot 3x}{3x^{-3}y^2}$	c) $\frac{\left(2pm^{-1}q^0\right)\cdot 2m^{-1}p^3}{2pq^2}$

XVIII. State the standard form for a quadratic equation and the quadratic formula.

Link to solving quadratic equations:
http://www.sosmath.com/algebra/solve/solve4/s43/s43.html

XIX. Solve the quadratic equation.

a) $9x^2+10=91$	b) $3x^2-16x=12$	c) $3x^2-12x-3=-x^2$